REMARKS

The present invention and the prior art cited by the Examiner all relate to an echo canceler that operates on a transmit signal including an echo of a received signal by generating an echo cancellation signal from the received signal and subtracting the echo cancellation signal from the transmit signal.

According to new independent claim 14, which is roughly equivalent to canceled claim 4, a signal level data generator generates signal level data for the transmit signal, and updates the signal level data when the transmit signal exceeds a first minimum level and the received signal is less than a second minimum signal level. The signal level generator leaves the signal level data unchanged when the receive signal exceeds the second minimum input level. A pair of automatic gain control (AGC) units amplify the transmit signal and the echo cancellation signal by gain factors responsive to the signal level data and update the gain factors when the signal level data are updated.

New independent claim 13 is a shortened version of new independent claim 14, including only the essential features related to updating timing and the minimum input levels.

Original claim 9 is a method claim generally equivalent to claim 14, but using the terms 'active' and 'inactive' instead of referring to minimum input levels.

Claims 1-12 were rejected under 35 USC 103 over Horna '815 in view of Lane '224. This rejection is moot as to claims 1-8, which are canceled, and is respectfully traversed as to claims 9-12.

The Examiner is invited to consider the Applicant's drawing sheet 3/8, showing (Fig. 4) that echo cancellation coefficients are updated only on conditions (a) and (d) in Fig. 3, i.e., when the transmit signal is high (above threshold "min") and the receive signal is low (below threshold "min"). This exemplifies clause (c) of claim 9, as was mentioned above.

The Examiner admits (Action, pages 2-3) that the main reference **Horna** does not disclose that feature and relies on **Lane** for disclosing it.

Lane distinguishes three signal energy modes: the LISTEN mode (the user is listening, signal energy is in the microphone signal), the TALK mode (the user is talking, signal energy is in the speakerphone signal), and the DOUBLE-TALK mode (mixed). Both of the AGC units operate with a gain that is updated in TALK and DOUBLE TALK modes. At col. 4, lines 19-36, Lane states that low signal levels of TALK and LISTEN (near (E_T=0, E_R=0) in Fig. 2) may confuse prior-art devices.

Lane's echo canceler has an AGC unit (53) for the transmit signal and a separate AGC unit (63) for the receive signal, but no AGC unit for the echo cancellation signal. Lane discloses that AGC 53 (Fig. 3) that selects one of the modes TALK, DOUBLE TALK, or LISTEN (col. 4, line 56). In the DOUBLE TALK mode (col. 5, lines 36-40), the AGC 53 applies a function f(G) = (G+1)/2.

The Examiner is invited to consider:

(1) The TALK mode corresponds generally to the situation in which the transmit signal is active (exceeds a first minimum level) and the receive signal is inactive (is less than a second minimum level). The DOUBLE-TALK mode corresponds generally to the situation in which the transmit signal is active (exceeds the first minimum level) and the receive signal is also active (exceeds the second minimum level).

Lane applies a transmitting gain G (col. 4, line 64) and "When in DOUBLE-TALK mode, AGC block 53 *adapts* the gain by performing a function f(G)" (col. 5, line 36; emphasis added). That is, the gain is changed.

By updating the gain in the DOUBLE-TALK mode, Lane et al. teaches directly away from claim 9 and new claim 14, which explicitly recite leaving the signal level data and hence the gains of the automatic gain control units unchanged whenever the receive signal is active (claim 9), or, exceeds the second minimum level (claim 14). This distinguishes claim 9 and new claim 14 from the combination of Horna and Lane, even if combined (combination not admitted obvious).

(2) Lane applies a transmitting gain G, as noted above, but applies a receiving gain G^{-1} on the receiving side (col 5, line 24), with G and G^{-1} being, as the notation implies, inverse to each other (Abstract, lines 3-6). However, claim 9 recites that the echo cancellation signal and the transmit signal are both amplified according to "the signal level data" generated for the transmit signal (clause (b) of claim 9).

(3) Lane's Fig. 3 shows that only in the LISTEN mode is the signal unchanged, while in all other modes there is some combination of G and G^{-1}. Since G is "adapted" as mentioned

above, so is its inverse G^{-1} and therefore Lane's disclosure is incompatible with the Applicant's Fig. 4, that shows change only for (a) and (d) of Fig. 3.

(4) The two modes of Lane are distinguished from the instant claims by the energy-ratio scheme illustrated in Fig. 5, which is unlike the minimum-level scheme of new claims 13 and 14.

The Inventor points out that leaving the signal level data and gain factors unchanged whenever the receive signal exceeds the second minimum level makes the present invention more stable than any combination of Horna and Lane (not admitted obvious), and the prior art does not suggest the advantage realized by the Applicant.

Withdrawal of the rejection and allowance of the new claims is requested.

Respectfully submitted,

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